

EXAMPLE 3. HYPOTHETICAL – NEW NATURAL GAS BOILER
(235 MMBTU/HR)

TOOLS:

Emissions Factors (EF) from AP-42, Section 1.4-2:

Pollutant	Emissions Factor (lb/MMSCF NG)*
PM	7.6
SO ₂	0.6
Pb	0.0005
NO _x	100
VOC	5.5
CO	8.4
Greenhouse Gases	
CO ₂	117.6 lb/MMBtu
CH ₄	0.00225 lb/MMBtu
N ₂ O	0.00216 lb/MMBtu

PROBLEM SOLVING:

Question 1: What would the emissions be for the proposed project?

Example Calculation:

PM₁₀ Emissions [tons/yr] =

(90 MMBtu/hr) * (1 MMSCF/1020 MMBtu) * (7.6 lb/MMSCF) * (8760 hr/yr) * 1 ton/2000 lb = **2.93 tons/yr**

CO₂ Emissions [tons/yr] =

(1304 MMBtu/hr) * (213.4 lb/MMBtu) * (8760 hrs/yr) * (0.0005 ton/lb) = 1218838

Calculations

Calculated Total Emissions from 235 MMBtu/hr NG Boiler (Tons/Year):								
PM ₁₀	SO ₂	NO _x	VOC	CO		CO ₂	CH ₄	N ₂ O
7.66	0.61	100.87	5.56	84.40				

Question 2: On a mass basis, what are the total emissions of GHGs?

CO₂+CH₄+N₂O = Total Emissions of GHG's (on a mass basis, tpy)

= _____ tpy

Question 3: What are the total emissions of CO_{2e}?

Step 1: Refer to Global Warming Potential (GWP) Table (Title 40, Part 98, Subpart A, Table A-1)

Step 2: Identify pollutants and their respective GWPs.

Pollutant	Global Warming Potential
CO ₂	1
CH ₄	21
N ₂ O	310

$$CO_{2e}(tpy) = \sum (GWP_i \times MassEmissionRate_i(tpy))$$

$$CO_{2e}(tpy) \text{ Example} = (\text{mass } CO_2 * 1) + (\text{mass } CH_4 * 21) + (\text{mass } N_2O * 310) =$$

Calculations [tons/yr] =

CO_{2e}=_____ tpy

Question 4: So, we have

GHGs(mass)	CO _{2e}

APPLICABILITY ANALYSIS:

Question 1: Does this action require a Title V permit (e.g. any pollutant > 100 tpy)?

Question 2: Does the permit action have GHG emissions in excess of thresholds?

≥0 tpy mass GHG emissions	Yes_____	No_____
≥100 tpy mass GHG emissions	Yes_____	No_____
≥ 75,000 tpy CO _{2e}	Yes_____	No_____
≥100,000 CO _{2e} emissions	Yes_____	No_____

Question 3: Does the permit action require a PSD analysis?

>100 tpy listed major source (ARM 17.8.801)	Yes_____	No_____
>250 tpy non-listed major source	Yes_____	No_____

What are the facility's permit requirements?

If the Permit Decision occurs before 1/2/2011: GHG's do not need to be considered

Step 1: If the permit decision occurs between 1/2/2011 and 7/1/2011:

PSD

Does the facility trigger a PSD action "anyway" (exceed 100 tpy for a listed source or 250 tpy)?

- If NO, then GHG's do not undergo PSD review.
- If YES, do the GHG emissions exceed thresholds?
 - a. Is it a major stationary source Yes/No
 - b. GHG mass ≥ 0 tpy Yes/No
 - c. CO₂e $\geq 75,000$ TPY Yes/No
- Yes to all - then the GHGs must undergo PSD review.
- No to either threshold - then the GHGs do not undergo PSD review.

Title V

Is the facility a Title V "anyway" source?

- No - GHG's do not need to be addressed.
- Yes - GHG's must be addressed in the Title V Operating permit.

Step 2: If the permit decision occurs after 7/1/2011:

PSD

1. Do any of the criteria pollutants exceed 100 tpy for a listed source or 250 tpy?
 - If Yes, then the facility must undergo PSD review for applicable regulated pollutants, and further analysis would be required to determine if GHGs are subject to PSD (refer to #2).
 - if no, then proceed to question #3
2. Do the GHG emissions trigger PSD?
 - a. GHG mass emissions ≥ 0 tpy? Yes/No
 - b. CO₂e emissions $\geq 75,000$ TPY CO₂e? Yes/No.
 - If Yes to both 1(a) and (b) - then the GHGs must undergo PSD review.
 - If NO to either 1(a) or (b) - then proceed to #3
3. Do the GHG emissions trigger PSD (continued from #2)?
 - a. GHG mass ≥ 100 (listed)/250 tpy? Yes/No
 - b. CO₂e $\geq 100,000$ TPY CO₂e? Yes/No
 - If Yes to both 2(a) and (b) - then the GHGs trigger PSD review and the facility must undergo PSD review for applicable regulated pollutants.
 - If NO to either 2(a) or (b) - then the GHGs do not trigger PSD review.

Title V

1. Is the facility subject to a Title V based on non-GHG?

- Non-GHG emissions ≥ 100 tpy Yes/No
 - If Yes, a Title V operating permit is required for this facility and must include GHG applicable requirements.
 - If No, proceed to number 2.

2. Is the facility subject to a Title V based (continued from #1)?

- a. GHG mass emissions ≥ 100 tpy Yes/No
b. CO₂e emissions $\geq 100,000$ TPY Yes/No

- If the answer is Yes to **both** 2(a) and 2(b), then the facility would need to obtain a Title V Operating Permit. The facility must include GHG applicable requirements.

- If the answer is No to (1) and **either** 2(a) or 2(b), the facility would not be required to obtain a Title V Operating Permit.